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have been forced upon me; but it is one that all who have come out here, with ideals such as mine, have been forced sooner or later to meet. The issue should have been placed squarely before me two years ago when I was considering the position. Had I then known that research was practically impossible I should never have come to the northwest. One can never learn the true conditions of an appointment from correspondence with the administrative officers. They are naturally biased. For that reason I have written this letter. I sincerely hope that it will enable others to choose less blindly than I.

X.

## A TYPICAL CASE

PROFESSOR ——— graduated at ——— University and, taking a postgraduate course, received the degree of Ph.D. He then went abroad, studied at ——— University, and returned to America, full of enthusiasm for original research. He had published an important memoir for a thesis which was well received, his instructors encouraged him and his fellow students appreciated and were interested in his work.

He now received an offer of a professorship in a small country college, married and began his new life, expecting to continue his investigations. He soon found that almost all his strength was consumed in teaching, and was horrified at the end of his first year that his salary had not been increased, as had been promised upon satisfactory service. This induced him to review his forces and readjust to the situation. He assumed a more sympathetic attitude toward the tyro and looked deeper into the organization and purposes of the institution. He began to fall in with the teaching problem and reduced the expenses of his department by taking a larger number of classes himself and for a nominal sum employed a few bright upper classmen a few hours weekly to do the drudgery. He attacked the problem of efficiency in instruction and found himself well equipped for the undertaking, for the machinery of his superior training gave a diamond point to his drill in the form of system and habits of thought, and

this was backed up by the battering-ram of a growing enthusiasm.

He also became interested in the historical and vocational aspects of his subject and began to relate himself and his work to the world he lived in. In process of time his ideas began to show themselves in increased comfort and efficiency in the lives of human beings. His teaching task was now a magnet to all his powers, while his classes forgot their examinations in the joy of their daily lessons.

On the Olympic heights of the university he had learned to despise the rôle of the sturdy farmer and faithful wife who were responsible for his birth and education and much of the ethics of that parental pair had become a mere convention or a timely expedient. But there stole into the years of the busy Ph.D. a renewed conviction of the high worth of social purity, and his fictitious ideas of temperance, kindness, etc., gave way to principles more in keeping with his earlier teaching, while he ceased to despise the ultimate source of his bread and butter.

The finding of such men as this—men adaptable to the highest needs of the small country college—would be a worthy object for a Committee of One Hundred.

S. L. MACDONALD

FORT COLLINS, COLO.

## SCIENTIFIC BOOKS

*Animal Experimentation and Medical Progress.* By WILLIAM WILLIAMS KEEN, M.D., LL.D., professor emeritus of surgery, Jefferson Medical College, Philadelphia, with an Introduction by Charles W. Eliot, LL.D., president emeritus of Harvard University. Boston and New York, Houghton Mifflin Company, The Riverside Press, Cambridge, 1914. Pp. xxvi + 312.

In this book Dr. Keen has brought together the thirteen papers on experimentation which he has published in various periodicals during the past twenty-nine years. Nine of these deal chiefly with the contributions which this method of research has made to medical—and chiefly surgical—progress, while the remaining papers are devoted to the antivivisectionists and what they have been doing. Not him-

self an experimenter, but convinced beyond recall of the absolute necessity of animal experimentation, the author is a veteran in its propaganda, and no one writes with fuller knowledge of the facts on both sides, with keener conviction of the correctness of his position, and with a more trenchant pen. With him it is "a common-sense, a scientific, a moral and a Christian duty to promote experimental research," just as "to hinder it, and still more, to stop it would be a crime against the human race itself, and also against animals."

The eminence of Dr. Keen as a surgeon adds all the more value to his opinion of the benefits which human surgery has derived from experimentation. A striking chapter in the book is that on modern antiseptic surgery and the rôle of experimentation in its discovery and development. It gives a graphic picture, first of the pre-antiseptic surgery with its terrors of suppuration, secondary hemorrhage, erysipelas, lock-jaw, blood poisoning, gangrene and high death-rate—a picture all the more graphic because of the author's experience with its realities; then of Lister's work, with his experiments upon one horse and one calf; and finally of the results, with the virtual elimination of the disastrous sequelæ of operations, the extraordinary reduction in mortality, and the wide extension of surgical treatment to formerly forbidden fields. Shortly after the battle of Gettysburg the author was called in one night to five cases of secondary hemorrhage; since 1876, when he began the practise of the antiseptic method, he has not seen as many such cases in all the years that have elapsed, nor has he seen a single case of hospital gangrene. Formerly healing by "first intention" was so rare that its occurrence was regarded as a triumph; now its absence is a disaster. Formerly a famous surgeon lost two out of every three of his patients after the operation of ovariectomy; now the mortality is often less than one per cent. The skull cavity and the abdomen with its organs were once avoided by the surgeon; now they are fearlessly entered. "The only question," says the author, "is, should Lister have made this final test first on a horse and a calf, or on two

human beings? Can any one with a sane, well-balanced mind hesitate as to the answer?" "In the past thirty years," he continues, "experimental research has produced a more fruitful harvest of good to animals and to mankind than the clinical observations during thirty preceding centuries."

To the present reviewer that aspect of the antivivisection agitation that is by far the most interesting is the psychology of it. It is characterized preeminently by an exaggerated love for animals, woeful ignorance, a proneness to make strong pronouncements without adequate knowledge, a disregard of facts, a lack of logical reasoning, a tendency to pervert the truth and to ascribe unworthy motives to scientific men, and a general lack of moral balance in propaganda. These qualities have been demonstrated so frequently that they have come to be expected as a matter of course in those who oppose the practise of animal experimentation. As a fact it is rare that one fails to find some of these qualities in all such persons. Dr. Keen has been impressed by this and he states the attitude of many of us when he says: "I have been compelled to conclude that it is not safe to accept any statement which appears in antivivisection literature as true, or any quotation or translation as correct, until I have compared them with the originals and verified their accuracy for myself."

The four chapters here devoted to the antivivisectionists are entitled "Misstatements of Antivivisectionists," "Misstatements of Antivivisectionists Again," "The Influence of Antivivisection on Character" and "The Antivivisection Exhibition in Philadelphia in 1914." These papers teem with specific instances illustrative of the peculiarities of the antivivisectionists, many of them dealing with the classical, oft-quoted examples of supposed barbarities of the experimenters. To any one who has read of these and who supposes them to be as charged in the indictment, the reading of the present book is highly recommended, for it shows how often and how wickedly the truth has been perverted for partisan purposes. Dr. Keen handles without gloves the opponents of scientific progress.

No one, in America at least, has been more roundly denounced by them, yet this denunciation, it may be mentioned incidentally, results in making him all the more cheerful. No earnest and unprejudiced seeker after the truth can turn from the perusal of this book without a feeling of disgust at the iniquitous kind of warfare that has been waged by the enemies of progress and without a keen recognition of the utter feebleness of their attitude. In relentlessly exposing them Dr. Keen deserves the gratitude of all men and women who love truth and humanity.

FREDERIC S. LEE

COLUMBIA UNIVERSITY

*An Introduction to the Study of Physical Metallurgy.* By WALTER ROSENHAIN, B.A., D.Sc., F.R.S. New York: Van Nostrand Company. 390 pages, 6×9. Illustrated. Net \$3.50.

The book is divided into two parts, the first section dealing with the structure and constitution of metals and alloys, the second with the properties of metals as related to their structure and constitution.

Taking up first of all the microscopic examination of metals, the author discusses the preparation of specimens, and the microscope used, then the microstructure of pure metals and alloys. This is followed by the thermal study of metals and alloys, the thermal diagram and its relation to the physical properties. Typical alloy systems are exemplified by the lead-antimony, lead-tin, zinc-aluminium, zinc-copper, tin-copper and certain ternary alloys, followed by the iron-carbon system.

The second part first reviews the mechanical testing of metals, the effect of strain on the structure, heat treatment, mechanical treatment and casting, and ends with a discussion of defects and failures.

To review the contents of this book thoroughly would take many pages, because the author has covered the broad field of metallography so thoroughly and so well. This is particularly true of the presentation of the comparatively new ideas on the structure of metals, the effects of strain and of annealing, developed from Beilby's amorphous metal

theory. The elongation of the crystals when strained, the production of slip-bands and their nature, the formation of amorphous layers and the hardening of metals by cold work, twin structure, fracture under tensile, shock and alternating stress conditions, the amorphous cement theory, are all most clearly set forth. The criticisms therefore must be on minor points and not on the broad lines of the book.

For example, on page 13, after mentioning the names of the earlier workers, Sorby, Martens, Osmond, Werth, Grenet, Charpy, Le Chatelier, Heyn, Wüst, Tammann, Andrews, Arnold, Roberts-Austen, Stead, Howe and Sauvœur, the author says: "The fact that the present author was privileged to count Roberts-Austen and Osmond amongst his personal friends, and that Arnold and Stead are still actively at work in this field, serves to show how very recent the whole development has been." Besides Arnold and Stead, many of those mentioned are "still actively at work" as current literature in the metallographic field amply proves.

On page 21, in describing the preparation of specimens for polishing, "the necessity of gripping the specimen in the vise" to file it is mentioned. Most people grip the file in the vise and rub the surface of the specimen on it.

On page 31, the reference to etching reagents is too short and might with advantage be expanded.

On page 162, as Ruff's work is mentioned, reference ought also be made to that of Witorf and of Hanemann.

The photomicrographs are all well chosen and excellently executed, but lose somewhat in not having a title beneath each, rather than in the list of plates.

In conclusion, the only change that could be suggested is in the section on the thermal diagram which should contain those diagrams showing partial solubility in the liquid state. A short classification according to solubility in both liquid solid states would help.

The author has succeeded in preparing an excellent book, interesting to the student, valuable to the metallurgist and engineer, and full of ideas for any one engaged in metallographic research. It is a book that can be